

### **REMARKS**

Claims 12-31 are pending in the application. Applicant has amended claims 12, 14, 16-22, 24-26, 28 and 30. Favorable reconsideration and allowance of this application is respectfully requested in light of the foregoing amendments and the remarks that follow.

Applicant has amended the specification to better clarify the recited subject matter of the claims. The amendments include external pressure taps 50 and 52 are formed into an enclosed path on and that extends to the end of the probe 20 and adjacent to the internal pressure taps 38 and 40, respectively, which is supported by the drawings. The amendments in the specification also clarify the reference to a "tap" is equivalent to a "port." No new matter is added.

The Examiner did not provide support for or a detailed description of a rejection of claims 19 and 21. Thus, Applicants respectfully request reconsideration and allowance of claims 19 and 21.

1. **Recapitulation of the Invention**<sup>1</sup>

The invention relates to an isokinetic sampling system 10 configured to draw a velocity of sample exhaust gas into a sampling probe equal to the velocity of exhaust gas outside the probe. The system 10 includes a probe 14 placed at an axial position within an exhaust gas conduit 12. Pollutant samples pass from the exhaust conduit 12 through the probe 14 and connected exhaust line 18, exiting the same at a terminus at a dilution conduit 72. A measuring means 30 includes a

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<sup>1</sup> This Section 1 is intended to provide the Examiner with some background information on the state of the art and applicant's contribution to it. It is *not* intended to distinguish specific claims from the prior art. That task is performed in Section 2 below.

quartet of enclosed passages or paths 32. A first pair of the paths are in communication with a pair of static pressure openings or ports 38 and 40 into the probe 14 configured to measure the static pressure in the probe 14. The other pair of paths 32 are in communication with a pair of openings or ports 50 and 52 to the external conduit configured to measure the static pressure within the exhaust conduit 12. The paths 32 are configured to provide a measure differential pressure between the exhaust conduit 12 and the interior of the probe 14 that enables a controller 62 and stepping motor 64 to actuate a throttle valve 68 in regulating a flow of ambient air into the dilution conduit 72. Based on the detected pressure differential between the static pressure in the probe 14 relative to the static pressure in the conduit 12, the flow rate of ambient air into the dilution chamber 18 varies so as to vary the sample flow rate through the probe 14 so as to return the static pressure in the probe 14 to equal the static pressure in the conduit 12. A sample tap 88 passes properly diluted emission samples to sample bag 92 or continuous sampler 94. Particulate matter is collected at a filter 96.

2. Rejection of Claims 16-25 and 31 under 35 U.S.C. § 112, second paragraph

The Examiner rejected claims 16-25 and 31 under 35 U.S.C. § 112, second paragraph, as being indefinite. Specifically, in claims 16 and 25, the Examiner indicated that recited “tap” is unclear. In claim 18, the Examiner indicated that recited “external” is unclear. In claim 31, the Examiner indicated that it is unclear as what does this material relate to in the drawings and/or written specification, and where does material first pass through the probe and then into an

exhaust conduit in the drawings. Applicant has amended claims 16-22, 24-26 to provide the proper clarity. Withdrawal of the objections is respectfully requested.

3. Rejection of Claims 12, 16, 20, 26-31 under 35 U.S.C. § 102(b)

Claims 12, 16, 20, 26-31 stand rejected under § 102(b) as being anticipated by Wendt (U.S. Patent No. 5,033,318). The applicants respectfully traverse this rejection because the cited reference does not disclose each and every element of the claimed invention. Therefore, reconsideration is in order and is respectfully requested.

Claim 12 as amended recites a system for extracting samples from a stream flowing in a conduit. The system includes a probe located in the conduit and having a channel for passing a sample flow from the conduit for analysis. The system further includes a regulating means for controlling the velocity of the sample flow through the probe channel to correspond to the velocity of the stream flowing in the conduit. The regulating means includes a means for generating a feedback signal representing the relative velocities of the stream flowing in the conduit and the sample flow through the probe channel, and a conduit static pressure measuring means formed in an *enclosed path located closely adjacent* an external surface of the probe. A filter for capturing particulate matter communicates with the probe channel. None of the cited references discloses a means for generating a feedback signal that includes a conduit static measuring means formed in an enclosed path located closely adjacent an external surface of the probe.

The Wendt patent discloses an apparatus for measuring particulate content of a flue gas. The apparatus includes a suction device 19 configured to draw outgoing air through a suction nozzle 13 extending into a flue 1 (col. 32, lines 29-33). Also, extending into the flue 1 are flow rate measuring pitot tubes 2 and 3 having inlets facing opposite directions relative to the flow direction of the flue gas (col. 2, lines 63-65). Pitot tubes 2 and 3 are connected to a pressure difference meter 4 operable to measure a rate of the flue gas (col. 2, line 65 – col. 3, line 4). Also extending in the flue 1 is a static pressure tube 7 and a zero pressure tube 8 connected by a differential meter 9 operable to signal actuation of valve 12 in maintaining zero pressure differential (col. 3, lines 4-15). The inlets of tubes 7 and 8 provide an indication of static pressure outside and inside the nozzle 3, respectively. Wendt shows the static pressure tube 7 stopping relatively flush with the wall of the flue 1 and well apart from the zero pressure tube 8 (See FIG. 1, emphasis added).

In operation, a velocity of the outgoing air in the flue 1 greater than zero creates a positive pressure differential between zero pressure tube 8 and static pressure tube 7 (col. 3, lines 65-68).

The differential meter 9 signals valve 12 to close, thereby reducing the air flow through a flush tube 14 (col. line 68 – col. 4, line 3). The suction device draws at a constant rate while the air flow through the flush tube 14 is reduced, causing a partial stream of flue gas to be drawn at the nozzle 13 (col. 4, lines 3-8). With an increase in outgoing air velocity, the pressure differential between tubes 7 and 8 increases, causing a reduction in flushed air flow and an increase in the partial stream of the flue gas drawn through nozzle 13 (col. 4, lines 8-11).

The Wendt patent does not disclose a conduit static pressure measuring means formed in an enclosed path located closely adjacent an external surface of the probe. To the contrary, the inlet of static pressure tube 7 is located *well away* from tube 15 and the nozzle 13. As a result, the inlet of the tube provides a less reliable pressure differential measurement than is achieved with the present invention, in which the external pressure port is located closely adjacent an external surface of the probe. A further review of the remaining cited references fails to disclose, teach or suggest this patentable subject matter. (For instance, Huber cannot cure this deficiency for reasons detailed in Section 6 below.) In light of the reasons stated above, claim 12 defines over the cited references on record and passage to allowance is respectfully requested.

Claim 16 as amended recites an isokinetic sampling system that includes a probe that is configured for insertion into a fluid stream, an internal pressure port and an external pressure port. The internal pressure port is configured to provide an indication of a static pressure within the probe. The external pressure port is formed in an enclosed path located closely adjacent an external surface of the probe and is configured to provide an indication of a static pressure in a portion of the fluid stream that surrounds the probe. The system further includes a flow control device configured to adjust a fluid flow rate through said probe, and a controller operable to control the flow control device. In response to pressure measurements obtained from the external and internal pressure ports, the controller is operable to maintain at least substantially equal static pressures internally of and externally to the probe.

The Wendt patent does not disclose an external pressure port formed in an enclosed path located closely adjacent an external surface of a probe. A further review of the remaining cited references fails to disclose this patentable subject matter. In light of the reasons stated above, claim 16 defines over the cited references on record and passage to allowance is respectfully requested.

Claim 20 is believed to be in condition for allowance for incorporating by reference the limitations of claim 16 and for defining additional features of the invention, which when considered in combination with those of claim 16 are not taught or suggested by the prior art relied upon in the rejection.

Claim 26 recites an isokinetic sampling system that includes a probe that is configured for insertion into a fluid stream. The system further includes an internal pressure port that is configured to provide an indication of a static pressure within the probe at a location adjacent a tip of the probe, and an external pressure port that is configured to provide an indication of a static pressure in a portion of the fluid stream that surrounds the probe at said location adjacent the tip of the probe. The system further includes a flow control device that is configured to adjust a fluid flow rate through the probe, and a controller that is operable to control the flow control device, in response to pressure measurements obtained from the external and internal pressure ports, to maintain at least substantially equal static pressures internally of and externally to the probe.

None of the cited references disclose an internal pressure port that is configured to provide an indication of a static pressure within the probe at a location adjacent to a tip of the probe, and an external pressure port that is configured to provide an indication of a static pressure in a portion of the fluid stream that surrounds the probe at the location adjacent the tip of the probe. As noted above, Wendt shows a static pressure probe 7 located well *away* from the probe 15 and nozzle 13. A review of the remaining references fails to cure this deficiency. In light of the reasons stated above, claim 26 defines over the cited references on record and passage to allowance is respectfully requested.

Claim 27 recites a sampling method that includes inducting a fluid sample into an interior of a probe disposed in a fluid stream; measuring a static pressure of fluid flowing through the interior of said probe; measuring a static pressure of a portion of the fluid stream surrounding said probe at a location closely adjacent an external surface of the probe; and based on the static pressure measurements, adjusting a fluid flow rate through the probe to at least substantially eliminate a static pressure differential between the interior and exterior of the probe. Wendt shows the location of measuring the external pressure of the probe well apart from the probe (note the location of the port 7 relative to the exterior of the probe 15). In light of the reasons stated above, claim 27 defines over the cited references on record and passage to allowance is respectfully requested.

Claims 28-31 are believed to be in condition for allowance for incorporating by reference the limitations of claim 27 and for defining additional features of the invention, which when

considered in combination with those of claim 27 are not taught or suggested by the prior art relied upon in the rejection.

4. Rejection of Claims 12-14, 16, 20, 22, 26-31 under 35 U.S.C. § 103(a)

Claims 12-14, 16, 20, 22, and 26-31 stand rejected under § 103(a) as being unpatentable over the Wendt patent.

Claim 12 is believed allowable for reasons similar to those described above. None of the cited references teach or suggest a sampling system that includes a conduit static pressure measuring means formed in an enclosed path located closely adjacent an external surface of the probe. A further review of the remaining cited references fails to teach or suggest this patentable subject matter. In light of the reasons stated above, claim 12 defines over the cited references on record and passage to allowance is respectfully requested.

Claims 13-14 are believed to be in condition for allowance for incorporating by reference the limitations of claim 12 and for defining additional features of the invention, which when considered in combination with those of claim 12 are not taught or suggested by the prior art relied upon in the rejection.

Claim 16 is believed allowable for reasons similar to those described above. None of the cited references teach or suggest an external pressure port that is formed in a location closely adjacent an external surface of the probe and in an enclosed path that is configured to provide an indication of a static pressure in a portion of the fluid stream that surrounds said probe.



Claims 20 is believed to be in condition for allowance for incorporating by reference the limitations of claim 16 and for defining additional features of the invention, which when considered in combination with those of claim 16 are not taught or suggested by the prior art relied upon in the rejection.

Claim 22 has been amended to place in independent form. Claim 22 is believed allowable because none of the cited references teach or suggest a variable speed pump coupled to the probe. The Examiner mistakenly uses hindsight in alleging that the controllable valve and the compressed air source disclosed in the Wendt patent suggest application of a variable speed pump connected to the probe. The variable speed pump operates in a different manner in performing isokinetic sampling. The variable speed pump is operable to directly draw a variable flow rate of sample from the conduit, in contrast the indirect method of varying a flowrate of dilution air to intermix with a sample in accordance with the combined valve and compressed air source. Furthermore, in view of these different manners of operation, the Examiner fails to provide any support that a control valve in combination with a compressed air source suggests a variable speed pump. Applicant respectfully requests allowance of claim 22.

Claim 26 is believed allowable for reasons similar to those described above. None of the cited references teach or suggest an internal pressure tap that is configured to provide an indication of a static pressure within the probe at a location adjacent to a tip of the probe, and an external pressure tap that is configured to provide an indication of a static pressure in a portion of the fluid stream that surrounds the probe at the location adjacent the tip of the probe. As noted

above, Wendt shows the static probe 7 stopping well apart from the probe and the nozzle 13. A review of the remaining references fails to cure this deficiency. In light of the reasons stated above, claim 26 defines over the cited references on record and passage to allowance is respectfully requested.

Claim 27 is believed allowable for reasons similar to those described above. None of the cited references teach or suggest the step of measuring a static pressure of a portion of fluid stream surrounding the probe at a specific location of measuring a static pressure flowing through the interior of the probe. In light of the reasons stated above, claim 27 defines over the cited references on record and passage to allowance is respectfully requested.

Claims 28-31 are believed to be in condition for allowance for incorporating by reference the limitations of claim 27 and for defining additional features of the invention, which when considered in combination with those of claim 27 are not taught or suggested by the prior art relied upon in the rejection.

5. Rejection of Claims 16,17, 24 and 25 under 35 U.S.C. § 103(a)

Claims 16, 17, 24 and 25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the Wendt patent in view of JA 54-39189 to Gijutsuin.

Claim 16 is believed allowable for reasons similar to those described above. None of the cited references teach or suggest an external pressure port located as claimed.

With respect to claim 17, none of the cited references teach or suggest a system that includes an external pressure port in an enclosed path located on an external surface of said probe.

The Gijutsuin patent discloses a constant rate sucking device that includes a port 8 of a suction nozzle 4 connected by a line 5 to a suction pump 7. A separate static pressure tube 11 having a static pressure port 13 is connected by a conduit 14 to a pressure gauge 10. A fixture 12 secures the static pressure tube 11 at a point apart from the conduit nozzle 4. Another separate static pressure tube 9 leads from the nozzle 4 to the pressure gauge 10. Conduits 9 and 14 are connected to a pressure differential gauge 10. In operation, adjustment of a bypass cock 6 allows adjustment of the flowrate by the suction pump 7 such that the static pressure in the exhaust gases at the measuring point is equal to the drawn exhaust gas.

The Gijutsuin patent does not teach or suggest measuring an external static pressure at the probe. Rather, the Gijutsuin patent teaches measuring the static pressure in a tube mounted by fixture 12 apart from the nozzle. Moreover, the Gijutsuin patent does not teach or suggest an external pressure port into an external conduit that is an enclosed path located on an external surface of said probe. In light of the reasons stated above, claims 16 and 17 define over the cited references on record and passage to allowance is respectfully requested.

Claim 24 is believed to be in condition for allowance for incorporating by reference the limitations of claim 17 and for defining additional features of the invention, which when considered in combination with those of claim 17 are not taught or suggested by the prior art

relied upon in the rejection.

Claim 25 as amended recites an isokinetic sampling system that includes, among other things, an external pressure port that opens into a conduit located on the external surface of the probe and configured to provide an indication of a static pressure in a portion of the fluid stream that surrounds the probe. For reasons similar to those described above for claims 16 and 17, none of the cited references teach or suggest a sampling system that includes an external pressure port into an external conduit relative to and that is located on the probe. In light of the reasons stated above, claim 25 defines over the cited references on record and passage to allowance is respectfully requested.

6. Rejection of Claim 18 under 35 U.S.C. § 103(a)

Claim 18 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over the Wendt patent in view of the Gijtsuin patent and in further view of U.S. Patent No. 3,784,902 to Huber.

The Huber patent discloses a particulate sensing apparatus that includes a sample probe 24 with a Pitot tube 28 configured to measure a *velocity* of the air stream, and a venturi constriction disposed inside the probe to measure a sample velocity in the probe (col. 3, lines 2-19 and FIG. 1). The apparatus attempts to provide isokinetic sampling by matching the air stream velocity and the sample velocity.

The Examiner mistakenly refers to the Venturi arrangement 40 as an internally mounted static pressure port usable in (See page 4 of Office Action dated October 10, 2003). Rather, the

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Huber patent teaches the Venturi arrangement 40 to measure a velocity of the sample in the probe, and uses the velocity to approximate the pressure in the probe (See Abstract and col. 3, lines 10-43). The venturi constriction taught by the Huber patent is not an internal static pressure port into the probe. In addition, Huber fails to disclose any external static pressure port *at all*.

The Petit tube 28 instead measures only *velocity*. Moreover, the inlet of tube 28, like the inlet of tube 7 in Wendt, is located well away from the exterior surface of the probe. In light of the reasons stated above, claim 18 defines over the cited references on record and passage to allowance is respectfully requested.

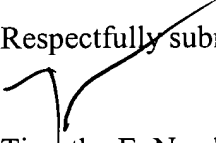
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### CONCLUSION

It is submitted that claims 12-31 are in compliance with 35 U.S.C. §§ 102 and 103, and each defines patentable subject matter. A Notice of Allowance is therefore respectfully requested.

A check in the amount of \$475.00 is enclosed in payment of the fee associated with a request for a three-month's extension of time by a *small* entity, which applicant hereby makes. Should the Examiner consider any additional fees to be payable in conjunction with this or any future communication, the Director is authorized to direct payment of such fees, or credit any overpayment to Deposit Account No. 50-1170. The Examiner is invited to contact the undersigned by telephone if it would help expedite matters.

Respectfully submitted,

  
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